

# **UNI AIR DASH 8-300, B-15239, FLIGHT B7 652 ENCOUNTERED ENGINE FIRE OCCURRENCE DURING TAKE OFF ROLL AT MAKUNG AIRPORT, PENGHU**

## **Executive Summary**

On February 4, 2009, UNI Airways Corp. (Uni Air) passenger flight B7 652, an DASH-8-300 registration B-15239 took off from Makung Airport to Tainan Airport for a scheduled passenger flight with 2 pilots, 2 cabin crew and 50 passengers in total 54 people on board.

At 1634, Taipei local time, the aircraft had take off roll at Runway 02 of Makung Airport. When take-off thrust setting was accomplished, the roll speed did not reach V1. Both pilots heard a 'bang bang'-abnormal sound and checked engine Interstage Turbine Temperature (ITT) to be 1,069°C. The cockpit instrument showed Engine no. 1 fire warning and the indication of Engine no. 1 instrument was going down. At the same time ATC notified pilots that Engine no. 1 had smoke and was on fire. Pilot in command reduced throttle and stopped the aircraft on the runway then started the ground emergency procedure.

The aircraft stopped at 5,100ft on Runway 02 and passengers on board were immediately evacuated to the windward side 100 meters from the aircraft and transported by shuttle bus to the terminal at 16:48. One passenger declared to have sustained minor sprain.

## **Findings Related to Probable Causes**

1. The over limit of shrinkage porosity was pre-existed in the power turbine first stage blade (PT1) of no.1 engine, under normal operation the fatigue cracking initiated from the shrinkage porosity. The PT1 blade fractured when the normal operation load over the strength of the cracked blade. The fracture blade debris damaged the rest blades of PT1 and PT2 during engine high speed rotation. That caused severe imbalance and vibration in the engine. The blade debris also jammed between the rotors and stators and then caused the engine sudden stoppage. The severe vibration and sudden stoppage resulted in the damage of the power turbine rotors, stators, shafts and turbine case. The engine internal hot air/mixture and engine oil

sprayed out to engine compartment, which caused over temperature and triggered engine fire warning, which caused the temperature of engine compartment over limit to activate the fire warning.

### **Findings Related to Risks**

1. The engine manufacturer PWC has issued Service Bulletin SB21766 to cover 1<sup>st</sup> stage PT blade that may have caused the shrinkage porosity defects. However, it did not cover the A2 broken blade in this occurrence and the X-ray check procedure before the occurrence cannot fully detect all defect blades.

### **Other Findings**

1. The aircraft's registration license, airworthiness certificate, and the maintenance log book within one month prior to the occurrence were all normal.
2. Though no. 7 bearing airtight hole was corresponding to the bearing hole, the angle is not compliance to what was shown in the maintenance manual and has 90 degrees of difference.

### **SAFETY RECOMMENDATIONS**

#### **To Transport Canada**

1. Require that Pratt & Whitney Canada incorporate measures to efficiently detect the shrinkage porosity which beyond maximum allowable limits of all Pratt & Whitney Canada PW123 series engines first stage power turbine rotor blades. (ASC-ASR-10-07-009)

#### **To Civil Aeronautics Administration, Ministry of Transportation and Communications**

1. Supervise Evergreen Aviation Technologies Corp. to implement that maintenance personnel follow maintenance procedures defined in maintenance manuals. (ASC-ASR-10-07-010)

**To Evergreen Aviation Technologies Corp.**

1. Implement and reinforce that maintenance personnel follow maintenance procedures defined in maintenance manuals. (ASC-ASR-10-07-011)